JAN MCLIN CLAYBERG

PATENT AND TECHNICAL TRANSLATION

JAN McLIN CLAYBERG*
OLAF BEXHOEFT**

5316 LITTLE FALLS ROAD
ARLINGTON, VIRGINIA 22207

TELEPHONE (703) 533-0333
FACSIMILE (703) 533-0334
JANCLAYBERG@YAHOO.COM

CERTIFIED BY AMERICAN TRANSLATORS ASSOCIATION
* GERMAN AND FRENCH TO ENGLISH
** ENGLISH TO GERMAN

July 19, 2006

DECLARATION

The undersigned, Olaf Bexhoeft, hereby states that he is well acquainted with both the English and German languages and that the attached is a true translation to the best of his knowledge and ability of the German text of PCT/EP2005/050374, filed 01/28/2005, and published on 11/17/2005 under No. WO 2005/108262 A1, and of sixty-five (65) amended claims.

The undersigned further declares that the above statement is true; and further, that this statement was made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any patent resulting therefrom.

Olaf Bexhoeft

Printing Machine Having At Least One Printing Unit for Imprinting a Web of Material to be Imprinted by Offset Printing in a Variable Cut Length and a Folder

Printing Machine Having At Least One Printing Unit for Imprinting a Web of Material to be Imprinted by Offset Printing in a Variable Cut Length

The invention relates to a printing press with at least one printing unit for imprinting a web of material to be imprinted by offset printing at a variable section length in accordance with the preamble of claim 1.

These printing installations can be operated for offset printing and allow printing of variable section lengths in order to increase in this way variability in respect to the printed products to be manufactured.

The object of the invention is based on creating a printing press with at least one printing unit for imprinting a material to be imprinted by means of offset printing with variable section lengths.

In accordance with the invention, this object is attained by means of the characteristics of claim 1.

An advantage of the printing installation in accordance with the invention lies in particular in that a folding apparatus, which permits folding at a variable section length, is indirectly or directly arranged downstream of the printing unit. It is possible in this way to match the fold section length to the printed section length, by means of which a highly efficient production of printed products is made possible.

Exemplary embodiments of the invention are represented in the drawings and will be described in greater detail in what follows.

Shown are in:

Fig. 1, a schematic structure of a printing installation in a plan view from above,

Fig. 2, the first section of the printing installation in accordance with Fig. 1 in a lateral view,

Fig. 3, the second section of the printing installation in accordance with Fig. 1 in a lateral view,

Fig. 4, the third section of the printing installation in accordance with Fig. 1 in a lateral view,

Fig. 5, an alternative embodiment of the printing installation in accordance with Fig. 1,

Fig. 6, a schematic lateral view of a printing unit in a modular construction for use in a printing installation in accordance with the invention,

Fig. 7, a transport system for conveying the modules of printing units in accordance with Fig. 6,

Fig. 8, a lateral view of a roll changer for use in a printing installation in accordance with the invention,

Fig. 9, a lateral view of a roll changer with a downstream-connected conditioning device for use in a printing installation in accordance with the invention,

Fig. 10, an asymmetrical superstructure system for use in a printing installation in accordance with Fig. 1,

Fig. 11, a symmetrical superstructure system for use in a printing installation in accordance with Fig. 1,

Fig. 12, a compact superstructure system for use in a printing installation in accordance with Fig. 1,

Fig. 13, an asymmetrical combination superstructure system for use in a printing installation in accordance with Fig. 1,

Fig. 14, a superstructure of a former for use in a printing installation in accordance with Fig. 1,

Fig. 15, varied product designs which can be produced in printing installations in accordance with the invention,

Fig. 16, different folding apparatus types which can be employed in printing installations in accordance with the invention,

Fig. 17, a lateral view of a folding apparatus for use in printing installations in accordance with the invention,

Fig. 18, a lateral view of a second embodiment of a folding apparatus for use in printing installations in accordance with the invention,

Fig. 19, a cutting cylinder pair of a folding apparatus in cross section,

Fig. 20, a second embodiment of a cutting cylinder pair for a folding apparatus in cross section,

Fig. 21, a schematic lateral view of a variable cover folding apparatus with an envelope supply device,

Fig. 22, an overview of varied product designs which can be produced in printing installations in accordance with the invention,

Fig. 23, a representation of folding options which are possible in printing installations in accordance with the invention.

A printing installation 01 is schematically represented in Fig. 1. The printing installation 01 is constructed of three

sections 02, 03 and 04, through which a web 06 of material to be imprinted (see Fig. 2) successively passes. The web 06 of material to be imprinted can be printed and further processed in a wet offset printing process in the printing installation 01. Alternatively to this, alternate forms of installations are also conceivable when suitable printing units are used, in which the web 06 to be imprinted is printed in a waterless printing process.

The first section 02 of the printing installation 01 is represented in a lateral view in Fig. 2. A roll changer 07, a conditioning device 08 and four printing units 02 are located in the first section 02 of the printing installation 01.

Rolls 11 of material to be imprinted of up to a width of 2520 mm can be stored in the roll changer 07. The web 06 of material to be imprinted of the appropriate width of 2520 mm is subsequently printed in the printing installation 01 and further processed into a finished printed product 20.

Conditioning of the web 06 to be imprinted takes place in the conditioning device 08. It is possible in particular to regulate the web tension of the web 06 to be imprinted by means of the conditioning device 08. Furthermore, the conditioning device 08 permits the regulation of the web edges of the web 06 to be imprinted. The web to be imprinted is printed on both sides in four colors in the printing units 09 arranged one behind the other.

The second section 03 of the printing installation 01 is represented in a lateral view in Fig. 3. After running through the four printing units 09, the web of material to be imprinted passes through a web-catching device, for example an intercept roller 12, and is conveyed on from there into a drying installation 13, in which all four print stages of the four

printing units 09 are dried together. Heating drums and/or blower nozzles, for example, for supplying the required heat are provided in the drying installation 13. A cooling device 14 with cooling rollers is located on the underside of the drying installation 13, by means of which the dried web 06 of material to be imprinted can be cooled. After passage through the cooling device 14, the web 06 of material to be imprinted reaches a dampening device 16, in which the web 06 to be imprinted is re-moistened.

Upon leaving the drying installation 13, the web 06 to be imprinted is coated with a silicon layer in a coating installation 17, and thereafter arrives in a draw-in and cutting device 18.

The third section 04 of the printing installation 01 is represented in a schematic view in Fig. 4. From the draw-in and cutting device 18, the web 06 to be imprinted arrives at a turning device 19 and is subsequently further processed into printed products 20 in a folding apparatus 21.

Fig. 5 shows an alternative embodiment of a third section 04a of the printing installation 01. In the third section 04a a former 22 for longitudinally folding the web 06 of material to be imprinted is interposed between the turning device 19 and the folding apparatus 21.

The structure of a printing installation in accordance with the invention can be seen by way of example in Fig. 1 to Fig. 5. It is of course possible to omit individual parts of the installation from or to add additional ones to it for constructing printing installations in accordance with the invention. The parts of the installation and functional elements described in what follows are also to be understood merely by way of example for explaining the invention and can, depending on the specific extent of the functions, be added or omitted.

A printing unit 09a embodied in a modular construction is represented in Fig. 6. The printing unit 09a has a frame 23, in which interchangeable modules 24 can be selectively fastened. Forme cylinders 26 and transfer cylinders 27 of different diameters are respectively provided in the different modules 24. For example, the different diameters of the forme cylinder 26 or transfer cylinders 27 of a second module 24 are shown in dash-dotted lines in Fig. 6. It is made possible by exchanging the modules 24 at the printing units 09a that the web 06 to be imprinted is printed with respectively different section lengths in the printing installation 01. Exchanging the forme cylinders 26 and transfer cylinders 27 as a function of the section length respectively necessary for performing the required printing job takes place by exchanging the modules 24. Modules 24 should preferably be provided in which the forme cylinders 26 and transfer cylinders 27 have a cylinder circumference between 1100 and 1500 mm, in particular 1156 mm, 1260 mm, 1320 mm and/or 1410 mm (for example with six DIN A4 pages), or modules 24 with 1680 mm, 1760 mm, 1880 mm (for example with six DIN A4 pages).

The forme cylinder 26 preferably has a circumference which corresponds to at least six horizontal DIN A4, preferably eight DIN A4 pages and is correspondingly provided with images. A ratio of the length to the circumference of the forme cylinder 26 preferably is 1:3 to 1:8, in particular 1:4 to 1:6.

In an advantageous embodiment, in a first operating state with a rubber blanket applied, the transfer cylinder 27 has a first diameter, and in a second operating state with a diameter applied has a second diameter, wherein the first and second diameters differ by at least 5 mm, preferably by at least 10 mm.

The inking system rollers and the damping system rollers are seated in the module 24 by means of pneumatic roller locks, not represented, i.e. at least two roller locks in accordance with WO 02/074542 having independently operating actuators, and can be simply set in this way. The roller locks are preferably arranged at least in part on levers which can be brought into and out of contact, or roughly adjusted. A fitting system is used in the frame 23 of the printing unit 09a for fixing the module 24 in place in the frame 23 in order to make positionally accurate seating easily possible. There is a quick-release coupling system for supplying the module 24 with air, water and electricity, by means of which the module 24 can be connected to the air supply, water supply and electrical supply of the frame 23. The web 06 of material to be imprinted sketched in Fig. 6 is conveyed through the printing gap formed by the two oppositely located transfer cylinders 07 and is thus printed on both sides by means of offset printing.

The inking systems 28, or the dampening systems 29 for supplying the two forme cylinders 26 with dampening agent and ink are each seated in the frame 23, wherein driving of the various inking system rollers and dampening system rollers takes place by means of a drive mechanism present in the frame 23. Furthermore, a separate drive mechanism for driving the forme cylinders 26 or transfer cylinders 27 is present in the module 24 and can be disconnected from the frame 23 together with the module 24.

It is also possible to provide each cylinder with its own drive motor, or each cylinder pair with its own drive motor, consisting of a forme and rubber blanket cylinder.

A transport system for exchanging the modules 24 is represented in Fig. 7. The transport system is embodied in the

manner of a gantry crane, whose trolley is arranged above of and subsequently connected with the module 24 when this module 24 is interchanged. As soon as the module 24 has been coupled to the trolley, the connection of the module 24 with the frame 23 is released and the module 24 is thereafter transported to a suitable storage location. Subsequently a fresh module 24 is transported to the appropriate frame 23 and fixed in place there in order to set up the printing unit for a new section length.

Fig. 8 shows a further embodiment 07a of a roll changer which can be employed in the printing installations in accordance with the invention. The roll changer 07a is particularly suitable for receiving exceptionally wide rolls 11 of material to be imprinted. Support straps 32 are provided for supporting the rolls 11 of material to be imprinted in the normal operating position, by means of which the roll 11 of material to be imprinted can be supported from below. With roll widths of, for example, more than 2000 mm, in particular starting at 2450 mm, the support straps 32 are pushed from below against the roll 11 of material to be imprinted and by means of this relieve the core positions by reducing the surface pressure at the clamping mandrel. Interferences, such as burst cores, formation of crépe folds, and lateral excursions of the web of material in the area of the tube close to the tube, are prevented, or reduced by this. In this case it is particularly advantageous if the support strap 32 can be driven by means of a drive mechanism, for example a rotary current motor, so that the required driving torque, or a portion of the required driving torque can be transmitted to the roll 11 of material to be imprinted.

Fig. 9 shows an alternative embodiment 07b of a roll changer which is particularly suited for web widths up to 2150 mm.

Drive belts 33 are provided at the roll changer 07b, which come into contact with the unwinding web 11 of material to be imprinted from above. It is preferably possible to arrange a second embodiment of a conditioning device 08a downstream of the roll changer 07b. The conditioning device 08a allows the regulation of the web tension by means of a separate second tensioning system, and furthermore has a web edge regulation system.

Fig. 10 represents an asymmetrical superstructure system 34, Fig. 11 a symmetrical superstructure system 36 and Fig. 12 a combined superstructure system 37. These superstructure systems can be additionally combined with printing installations in accordance with the invention when processing large web widths.

Fig. 13 shows a further embodiment of an asymmetrical combination superstructure system 38, which can be combined with printing installations in accordance with the invention.

Fig. 14 schematically shows a superstructure system 39, which is embodied in the matter of a former superstructure with folding apparatuses of small and large format.

As can be seen in Fig. 15, an extraordinarily large product variety by means of offset printing can be achieved by the combination of formers and turning bars in the superstructure system, as well as in the folding apparatuses for different production in an amount of four, six or eight pages.

As can be seen in Fig. 16, the insertable cylinder cassettes directly cover the production options by means of variable folding apparatuses V7-940, V7-1160, V5-1092 and V5-3000.

A further embodiment 21a of a variable folding apparatus with the system 7.7 is schematically represented in Fig. 17. The type of such a folding apparatus can also be taken from EP 0 257 390 B1, for example. At the inlet of the web 06 of material to be

printed, the folding apparatus 21 has a traction roller pair 41, by means of which the web 06 of material to be imprinted is electronically charged. The web 06 to be imprinted is cut into individual sheets in accordance with the predetermined section length in a downstream located cutting roller pair 42. Acceleration belts 43 are arranged downstream of the cutting roller pair 42, in which the individual sheets can be accelerated. The sheets subsequently reach a cylinder 44, in particular a collection cylinder 44 and/or folding blade cylinder 44, and from there are passed on to a folding jaw cylinder 46, which can be provided with springs. Here, the cylinder 44 has two multi-armed instrument supports, which can be displaced in respect to each other. When cutting the folded sheets it is possible to change the section length by adjusting the two instrument supports. Electric motors 47, in particular servo motors 47, are provided for driving the various functional elements of the folding apparatus 21a, which can be controlled independently of other drive mechanisms. The cylinder part and the delivery device of the folding apparatus 21a can be driven independently of each other. Preferably the cylinder 44 has folding blade systems and holding systems, for example gripper systems or spur needle systems, arranged on instrument supports. In this case at least 3, but preferably 5 or 7, such systems are respectively provided here.

A distance between the holding system and the folding blades of the folding blade cylinder 44 can be set as a function of a diameter of a forme cylinder 26 and/or a transfer cylinder 27 via a control device by remote control.

Fig. 18 shows a further embodiment 21b of a folding apparatus which can be employed in printing installations in

accordance with the invention. In the system 5:5, the folding apparatus 21b is constructed with a double third fold and two transverse fold delivery systems. A cutting roller pair 42 is also provided at the inlet of the folding apparatus 21b. The folding apparatus inlet of the folding apparatus 21 is designed in such a way that the matching of the format takes place as a function of the section length during offset printing by means of the cutting cylinder pair 42, which revolves in respect to the forme cylinders at a fixed number of revolution ratio. Depending on the circumferential format, at a defined number of revolutions the cutting cylinder pair 42 permits continuous webs of greater or lesser length to pass the transverse cutting group before cutting takes place.

Fig. 19 and Fig. 20 respectively show a cutting cylinder pair 42 with the start of the acceleration section for accelerating the sheet to folding cylinder speed. In this case the cutting cylinder pair 42 can be driven in a clocked manner at the clock rate of the forme cylinders. Alternatively or in addition thereto the cutting cylinder pair 42 can be driven at a preset number of revolution ratio in respect to the number of revolutions of the forme cylinders. As a result it is respectively achieved by this that the cutting cylinder pair 42 is driven at a preset speed, independently of the web speed of the web of material to be imprinted in order to vary in this way the section length of the folding apparatus 21.

Fig. 21 shows a cover folding apparatus 21c with cover feeding. For example, the design of a magazine with a cover made of heavier and higher quality paper than the inside normally requires the time-consuming and expensive work step at the collection stitching device during further processing. But with

the cover folding apparatus 21c, the pre-printed covers can be fed directly to the printing press. Following stitching and folding, the magazine need only be cut on three sides in the continuous cutter and is ready for delivery after that. At four pages in size, the pre-printed continuous cover web is conducted at half speed to the cover folding apparatus 21c, where transverse cutting takes place in the feed-in device. Now the cover is accelerated to the speed of the folding cylinders and placed on top of the collected inner pages in order to be thereafter stitched and folded together with them.

The various possibilities for varying the printing products to be produced in regard to the variable section length of the folding apparatus can be seen in Figs. 22 and 23.

List of Reference Numerals

01	Printing installation
02	First section of the printing installation
03	Second section of the printing installation
04	Third section of the printing installation
05	-
06	Web of material to be imprinted
07	Roll changer
08	Conditioning device
09	Printing unit
10	-
11	Roll of material to be imprinted
12	Intercept roller
13	Drying installation
14	Cooling device
15	-
16	Dampening device
17	Coating installation
18	Draw-in and cutting device
19	Turning device
20	Printed product
21	Folding apparatus
22	Former
23	Frame
24	Module
25	-
26	Forme cylinder
27	Transfer cylinder

28	Inking system
29	Dampening system
30	-
31	Transport system
32	Support strap
33	Drive belt
34	Superstructure system
35	-
36	Superstructure system
37	Superstructure system
38	Superstructure system
39	Superstructure system
40	-
41	Traction roller pair
42	Cutting cylinder pair
43	Acceleration belts
44	Cylinder, collection cylinder, folding blade cylinder
45	-
46	Folding jaw cylinder
47	Electric motor, servo motor